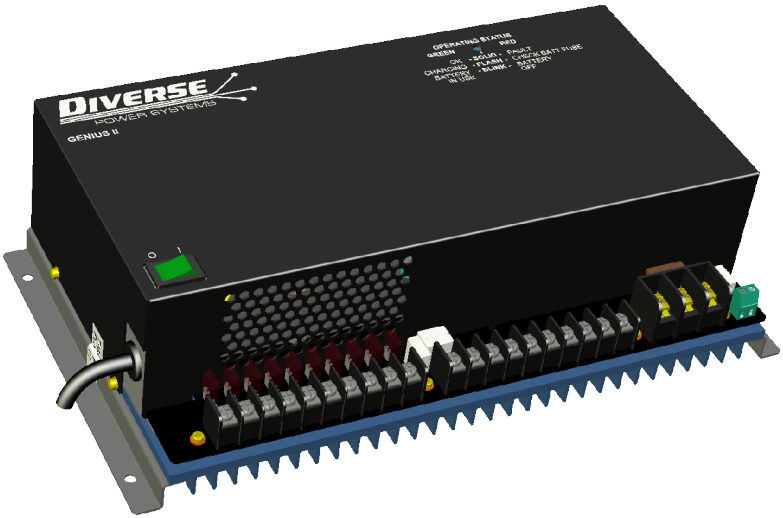
GENIUS-II POWER SUPPLY

Owner's Manual



Please read the Installation section of this manual before installing the product.

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Disclaimer

Diverse Power Systems makes no claim as to the accuracy or suitability of the information contained in this manual. Diverse Power Systems accepts no liability for any loss or damage, which may occur as a result of improper or unsafe use of its products.

Warranty is only valid if the unit has not been modified by the customer and has not been misused.

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Introduction

Safety Precautions

Please read the Safety Precautions carefully before installing the power supply. Be sure to observe all precautions without fail.

After completing installation, conduct a trial operation to check for faults.

⚠ **WARNING**	Failure to follow these instructions properly may result in personal injury or loss of life.
Ensure that there is good ventilation from the battery area.	
This appliance is not intended for use by young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.	
Batteries are electrically alive at all times and must be treated with extreme caution. They can supply high short circuit currents, even if they appear damaged.	
Take care that dropping or touching of metal objects onto the battery cell does not cause short circuits.	
Remove any personal metal adornment such as a chain, watch or ring, which could cause short circuits and personal injury.	

⚠ **CAUTION**	Failure to observe these instructions properly may result in property damage or personal injury, which may be serious depending on the circumstances.
Refer to the installation section before operating. Correct installation is the most critical factor in ensuring the safe use of the power supply. If every consideration of these instructions has been satisfied the power supply will be safe to operate.	
Ensure that cable connections to batteries have the correct polarity and are protected against accidental short circuit.	
Ensure that the shrouding supplied with the battery is fitted to the terminals.	
Before servicing a battery, disconnect the power supply from the mains supply.	
Do not charge non-rechargeable batteries. Failure to do so may result in the battery catching on fire or possible explosion.	
Do not allow water or other liquids to enter the installation area.	

Accessories

Accessories provided with this product are:

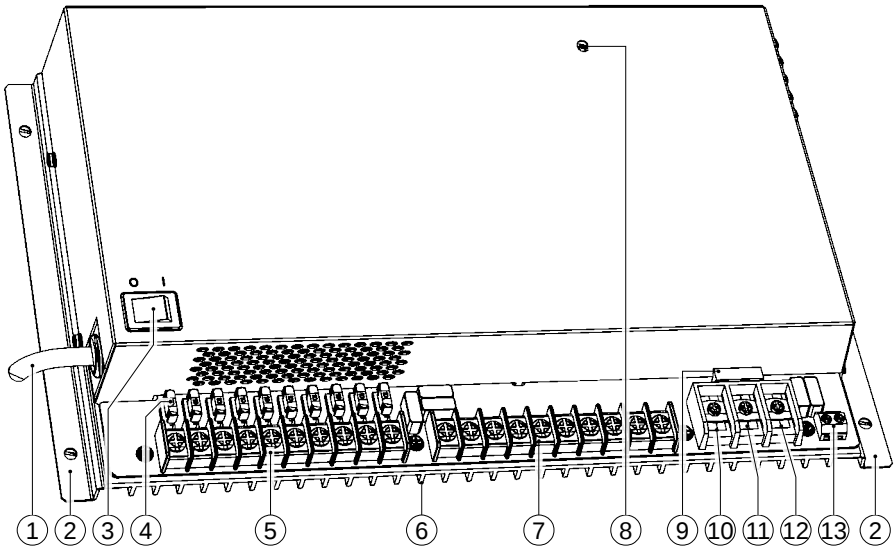
1. Owner's Manual

About the Genius-II Power Supply

The Genius-II has been designed for use in caravans and similar recreational vehicles, providing a DC power system with optional battery back up. The units operate from 240 Vac and provide an isolated 13.65 Vdc output at 35 A for powering the load and charging the caravan battery. All the necessary protection and operating features for the load and battery are provided. An optional DC input is also provided to enable battery charging and powering of the load from an external +13.8V DC power source.

The unit is fully enclosed ready for direct wall mounting. All connections are at the base of unit providing convenient wiring and installation. User access to all load and battery fusing has been provided at the base of the unit.

Names and Functions of Parts



① **Mains Cable (permanently connected)**
240 V input power for charging the caravan battery and powering loads

② **Mounting Bracket**

③ **Illuminated Power Switch**
240 V input power switch

④ **Load Fuses**
Ten fuses for the 12 V loads

⑤ **Load Terminal block, positive connection**
Used for connecting the positive wire of the 12 V loads

⑥ **Heatsink Fins**
Air flow past the fins removes excess heat from the unit

⑦ **Load Terminal block, common negative connection**
Used for connecting the negative wire of the 12 V loads

⑧ **Indicator**
Multi-colour Status indicator

⑨ **Battery Fuse**
Fuse for caravan battery connection

⑩ **Battery Negative Terminal**
Connection point for battery negative terminal and external DC input negative wire

⑪ **Battery Positive Terminal**
Connection point for caravan battery positive terminal

⑫ **External DC input Terminal**
Connection point for external DC input positive wire

⑬ **Remote Switch Terminal block**
Terminal block for connecting an optional remote switch. This switch is used to disconnect the loads from all power.

Installing The Genius-II Power Supply

Personnel

Installation is to be carried out only by suitably qualified personnel.

Ventilation, Orientation, and Thermal Considerations

The preferred orientation is with the cooling fins vertical and located such that there is a minimum of 80 mm free air space above and below them. This allows for the lowest operating temperature of the internal electronics and hence the highest reliability of the product.

The final enclosure must also provide adequate ventilation to the outside world (or larger internal cavity) to prevent excessive heating of the air within the enclosure.

The unit is rated to provide full power in both vertical and horizontal orientations with enclosure air temperatures up to 50 C.

Note: The enclosure air temperature can easily exceed 50 C if adequate ventilation is not provided.

The unit has over-temperature protection, meaning it will shut down if its internal temperature rises above a safe level. The unit will automatically restart once it has cooled to an acceptable level.

⚠ **WARNING:** Do not install unit in same compartment where flammable material such as petrol is stored.

Mounting

The Genius-II should be securely mounted to a suitably strong surface, using the two pre-drilled mounting brackets. Dimensional details are provided in Figure 1 below.

Mains Cable

⚠ **WARNING:** If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

This is pre-cabled and fitted with AS/NZ mains plug ready for connection to an internal 240 V GPO. Ensure that the connection to the mains supply is in accordance with the national wiring rules, and that the earth connection is installed.

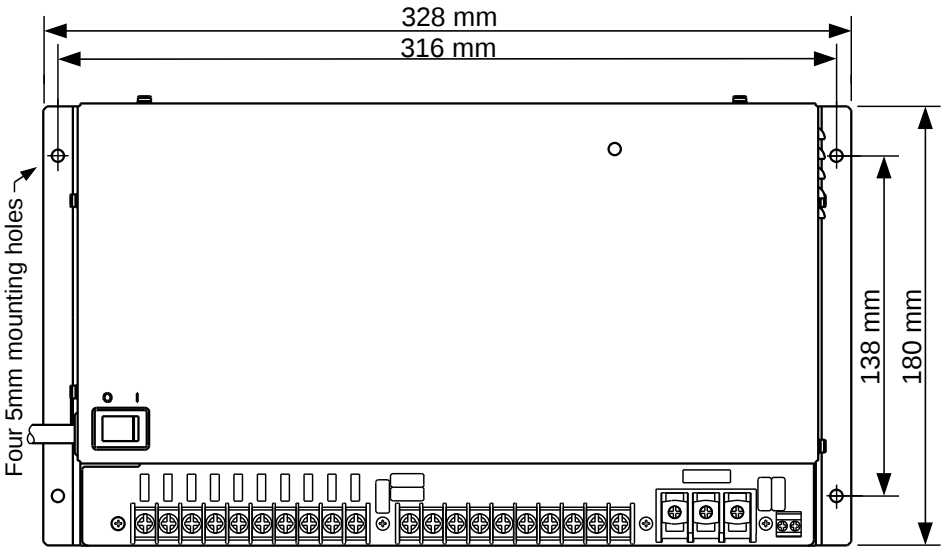


Figure 1: Mounting holes

Load, Battery and External DC Input Connections

All DC connections should be wired according to Figure 3 on page 11.

A block diagram of the basic internal wiring of the Genius-II can be found in Figure 4 on page 14.

Wire Size

DC cables must be sized to carry the maximum full load current and to not exceed the system volt drop requirements. The following cable sizes are recommended.

When running wires, if they pass through panels or wall, ensure the wires are protected form damage by sharp edges. One option is to use cable glands.

Current	Minimum Wire Size
0 – 10 A	1.0 mm² or 18 AWG
10 – 20 A	3.0 mm² or 14 AWG
20 – 30 A	5.5 mm² or 10 AWG

Table 1: Wire Size Recommendations

Load Connections

Up to 10 independently-fused loads may be connected. Loads are attached using the two 10-way terminal blocks.

Refer to Table 1 for wire size recommendations.

Where the wires connect to the terminal blocks, they should preferably be fitted with a spade terminal. In order to fit into the terminal block, spade terminals need to conform to the dimensions provided in Figure 2.

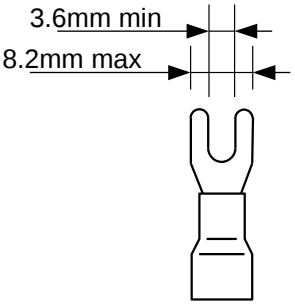


Figure 2: Spade Terminal Dimensions

Caravan Battery Connection

Connect the caravan battery to the terminals shown in Figure 3 on page 11.

Refer to Table 1 for wire size recommendations.

The positive connection has an on-board fuse so no additional fusing is required.

External DC Input Connection

⚠ **CAUTION:** Suitable fuse protection must be provided for the “DC In +VE” input. A fuse rating not exceeding 30 Amps must be used.

The power supply terminal “DC In +VE” provides an alternative option for powering of the load and charging of the batteries when mains voltages are not present. This input is to be powered from a suitable +12 V system. (e.g. your Car). The voltage of this external DC power source should not exceed 14.8 volts.

This input is diode isolated, so it is strictly an input; the Genius-II will never supply current to anything connected to this terminal.

This is the preferred input for a car battery connection.

Note: The Genius-II does not provide battery charging management when operating in this configuration (no mains, DC power provided through the external input). In this configuration current and voltage control for the battery must be provided from the external source.

Solar Panel Connection

⚠ **CAUTION:** Solar panels should not be directly connected; a solar panel voltage regulator must be fitted between solar panels and the battery.

Solar power should (through a series voltage regulator) be connected directly into the caravan battery circuit. See Figure 3 on page 11.

The solar power may the wired directly to the caravan battery, or it may be wired

to the caravan battery connections on the Genius-II. Use whichever connection point is most convenient from a wiring perspective.

Note: A solar panel voltage regulator with maximum output voltage not exceeding 14.8 volts must be used at all times. Failure to use a voltage regulator may result in power supply damage.

Remote Load-isolator Switch Connection

The Genius-II allows for remote control of the load connections. A pair of contacts are provided for connection to the external switch. When this switch is closed, all loads are disconnected from all power.

Battery charging is not effected by this switch.

The switch current when closed is less than 1 mA, so any convenient switch and wire size may be used.

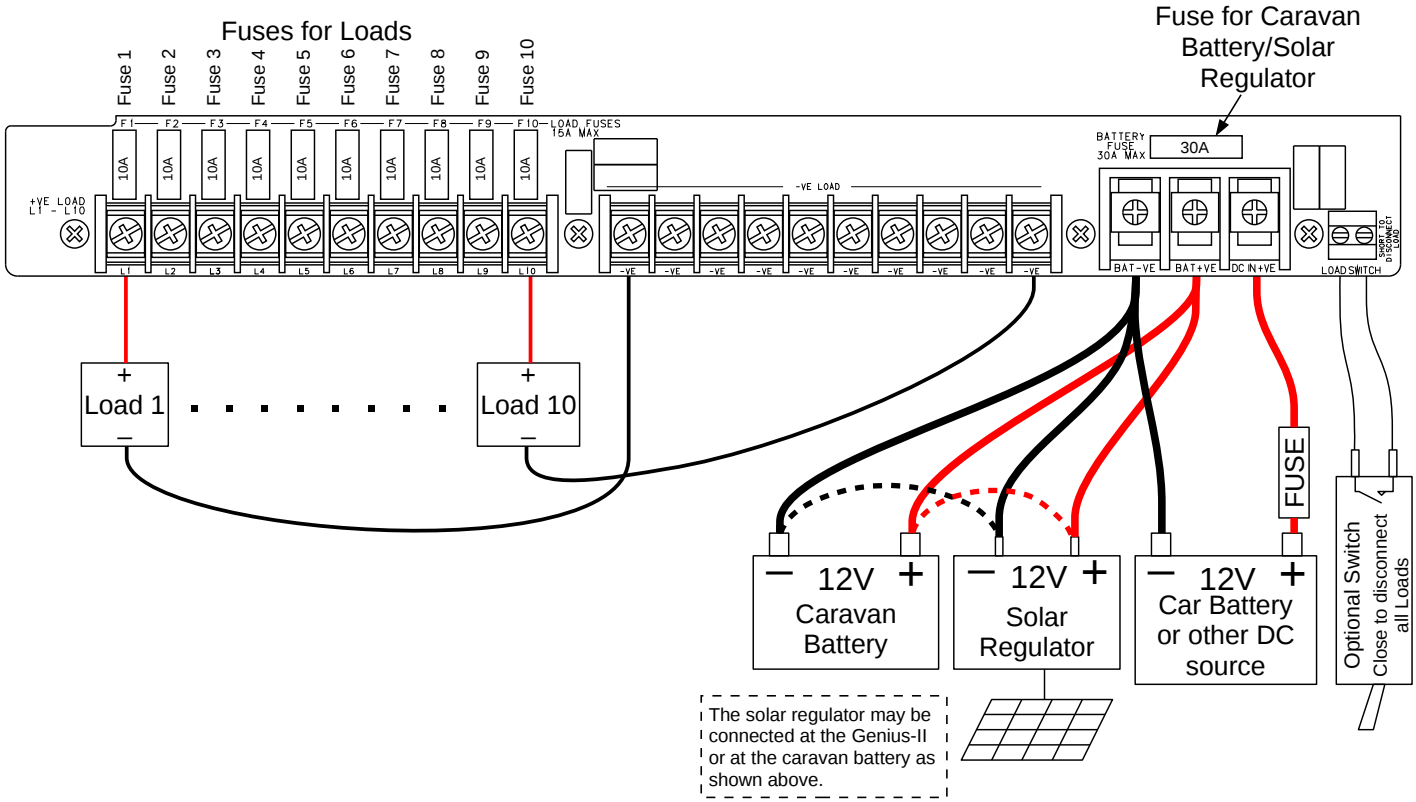


Figure 3: DC Wiring Diagram

Battery Connection/Disconnection Procedure

⚠ **WARNING:** Sparks have the potential to cause an explosion should combustible gases be present. The following procedures are designed to minimise the risk of spark generation while connecting or disconnecting the battery.

Battery Connection Procedure

The caravan battery should be connected as per the following steps.

1. Remove mains power to the Genius-II
   Turn off the power switch on the Genius-II
2. Disconnect all loads
   Turn off all 12 volt equipment connected to the Genius-II
3. Connect the positive battery terminal.
4. Connect the negative battery terminal.

If the battery negative is connected to chassis, ensure a connection exists from chassis to the “Bat –VE” terminal of the Genius-II.

Battery Disconnection Procedure

The caravan battery should be disconnected as per the following steps.

1. Disconnect all loads
   Turn off all 12 volt equipment connected to the Genius-II or disconnect the loads using the remove load-disconnect switch.
2. Remove mains power to the Genius-II
   Turn off the power switch on the Genius-II
3. Disconnect the negative battery.
4. Disconnect the positive battery terminal.

Batteries

Note: This battery charger is rated to charge a single 12 V (up to 6 cells) lead acid battery of up to 100 Ah capacity. Charging current is limited to 15 A.

When using batteries with this product always consult with the battery manufacturer for a detailed description of the installation, use and maintenance of the battery.

Ensure the battery has been charged for several days before a major camping trip (Leave the Genius-II power supply on for at least 2 days, preferably 5 days, with battery connected.)

This product is suitable for charging 12 V Sealed Lead-Acid (SLA) batteries including Valve-Regulated Lead-Acid (VRLA) batteries, both Absorbed Glass Mat (AGM) and Gel batteries.

Storage

If the caravan is to be stored for a long period of time, first fully charge the battery and ensure all loads are disconnected. Recharge the battery at least once every 6 months. Regular recharging will prevent the battery from becoming deeply discharged—a condition which can significantly shorten battery life.

Deeply Discharged Batteries

This battery charger is not designed to charge deeply discharged batteries. Its effectiveness in charging such a battery is a function of the depth of discharge and the battery size. Bigger (higher capacity) batteries will be more troublesome in this respect.

In normal use a battery connected to the Genius-II should never become deeply discharged, so recharging it should never be a problem.

If a battery has become deeply discharged and the Genius-II will not charge it, remove the battery (see Battery Connection/Disconnection Procedure on page 12) and charge it with a stand-alone charger. Once the battery voltage has recovered to normal levels and the charge current is less than 15 A, it may be reinstalled.

Servicing

This product contains hazardous voltages and energy hazards, which can result in death or injury. Only properly qualified service personnel may service it.

There are no internal user serviceable parts. Only the fuses located in the exposed terminal block area are user serviceable.

Isolate mains power, batteries and other DC input sources before servicing.

Fuses: Only the DC output Load and Battery fuses may be replaced.

Fuse ratings:	Loads: 32 V Automotive Mini-blade Fuse, 15 A maximum Battery: 32 V Automotive Regular Blade Fuse, 35 A maximum
Factory-fitted fuses:	Loads: 10 A Battery: 30 A

Functional Description

Functional Diagram

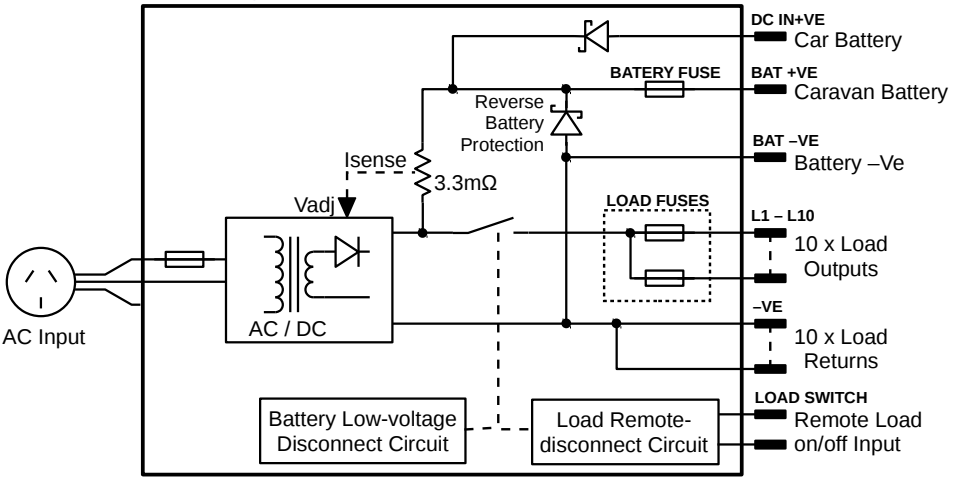


Figure 4: Functional Schematic

AC/DC Power Supply

This provides an isolated 13.65 Vdc output for powering of the load and charging of the battery. Battery current is sensed and monitored by the power supply to limit the charging current to 15 A maximum.

Fault Protection

The power supply provides automatic protection for overload including short circuit, over-voltage, over-temperature and reverse connected battery.

In overload, short circuit, and over voltage condition the power supply will shut down. It will then automatically attempt to restart every 5 seconds until such case that the fault is removed.

Fusing

Each load circuit and the caravan battery connection have been fused to provide fault protection and discrimination. Refer to the servicing section for fuse ratings.

Battery Charging Features

The power supply (Genius-II) provides full battery management as per the

following: The power supply is a three stage battery charger with Boost, Float, and Store charging modes to ensure long battery life. Charging current is limited to a maximum of 15 A. This provides optimum life for the batteries. Details of the charging process can be found in the Battery Charging Management section below.

The power supply is able to deliver 35 A maximum to the battery and loads. The 15 A battery charging rate is only possible if the load current is 20 A or less. If the load current exceeds 20 A, the maximum battery charging current will be reduced accordingly.

Note that for the Genius-II to operate in the manner described above, all loads must be connected to its load terminals, not directly to the caravan battery.

Low Voltage Disconnection of the batteries is provided to prevent deep discharge of the battery. Automatic reconnection occurs when battery voltage recovers. Battery Current Drain is less than 3 mA.

Battery Charging Management

To maintain the battery in a good state of health, an intelligently controlled charging algorithm is used. The purpose is to ensure that the correct voltages are applied to the battery terminals at the appropriate times throughout it’s usage cycle. The basics of the charging algorithm are detailed in Figure 5 below.

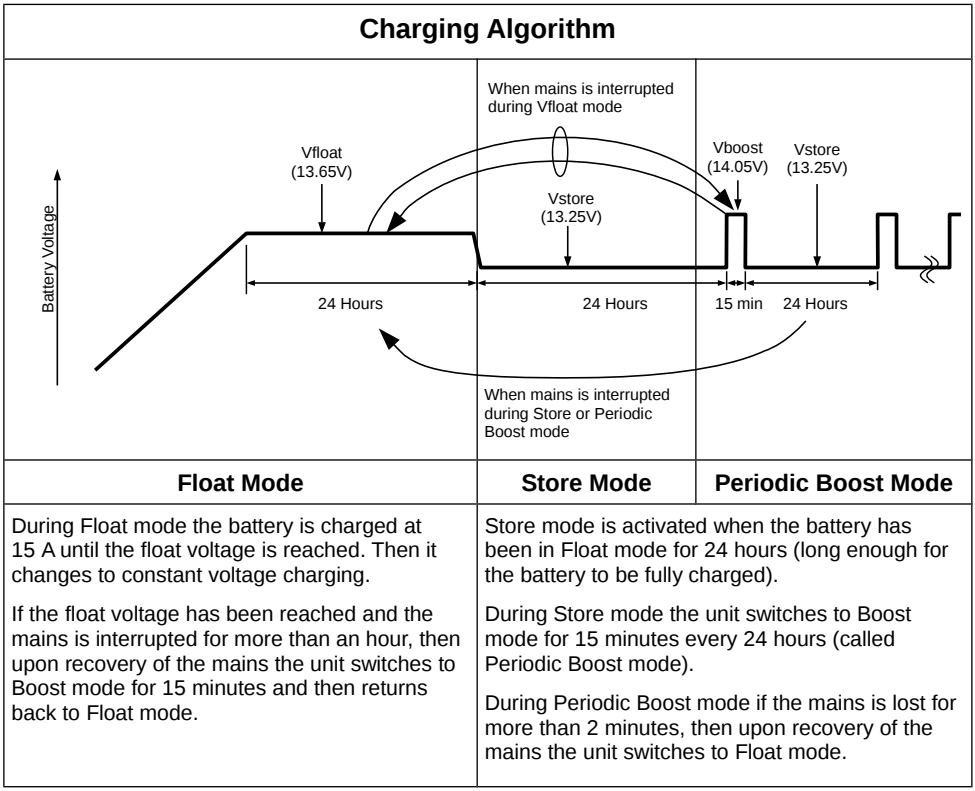

Charging Algorithm
When mains is interrupted during Vfloat mode
Vfloat (13.65V)
Vstore (13.25V)
Vboost (14.05V)
Vstore (13.25V)
Battery Voltage
24 Hours
24 Hours
15 min
24 Hours
When mains is interrupted during Store or Periodic Boost mode
Float Mode
Store Mode
Periodic Boost Mode
During Float mode the battery is charged at 15 A until the float voltage is reached. Then it changes to constant voltage charging.
If the float voltage has been reached and the mains is interrupted for more than an hour, then upon recovery of the mains the unit switches to Boost mode for 15 minutes and then returns back to Float mode.
Store mode is activated when the battery has been in Float mode for 24 hours (long enough for the battery to be fully charged).
During Store mode the unit switches to Boost mode for 15 minutes every 24 hours (called Periodic Boost mode).
During Periodic Boost mode if the mains is lost for more than 2 minutes, then upon recovery of the mains the unit switches to Float mode.

Figure 5: Charging Algorithm

Battery Charging Store Mode

During float charging (typically at 13.65 V) there is continuous charging current into the battery, sufficient in a long term charging situation to cause corrosion on the battery positive plate. To prevent this corrosion the charger utilises what is called a storage mode, where the charging voltage is reduced to 13.25 V. In this mode the charging current is very small, usually less than the battery's self-discharge current.

If left continuously in Store mode, the battery would slowly discharge, so to prevent this the charger switches to Boost mode for 15 minutes once a day. This is sufficient to keep the battery fully charged.

The net result is a battery which can be left on charge indefinitely without the usual battery degradation problems from continuous charging.

LED Indicator

A multi-colour LED indicator is provided to indicate the following operating conditions:

Colour	Condition
Green (Solid)	Mains present AND battery fully charged (battery charging current less than 1 A)
Green (Flash)	Mains present AND Battery Charging AND loads connected
Green (Blink)	No Mains and Battery voltage above disconnect voltage (The battery is powering the loads)
Red (Solid)	Mains present AND battery connected AND power supply in over-temperature shutdown mode
Red (Flash)	Mains present AND Battery fuse blown
Red (Blink)	Loads disconnected via remote disconnection switch
Red and/or Green flashes of unspecified duration	Output overload or Other unspecified fault

Table 2: LED Indications

Notes:

a) LED on continuously
b) Typically 0.25 second on, 0.25 second off
c) Typically 0.25 second on, 4 second off

Specifications

Input Voltage:	240 Vac nominal, ±10%, 50/60 Hz The power supply will withstand a 5 minute, +15 % surge on the maximum nominal voltage
Input Surge:	< 40 A (cold start)
Holdup Time:	< 10 mS at full load current and over nominal input voltage operating range
Output Current:	35 A Continuous (load + battery current)
Factory Set Voltage:	13.65 V +/0.1 V (Float voltage)
Load Regulation:	< 2 %
Output Ripple Voltage:	< 150 mV
Over Voltage Protection:	< 17 V
Over Current Protection:	35 A to 38 A (load + battery current)
Battery Current Limit:	15 A ± 1 A
Battery Connect:	11.5 ± 0.2 V
Disconnect:	10.0 ± 0.2 V
Battery Drain:	< 3 mA
Efficiency:	> 84 %
Cooling Fan:	Thermally controlled
Ambient:	0 C – 50 C
Weight:	3.7 kg
Standards:	Safety: AS/NZS 60335.1, AS/NZS 60335.2.29 EMC: AS/NZS CISPR 22 Class A Compliance: ERAC

After-sales Service

⚠ **WARNING: Do not disassemble, modify, or repair the unit.**

Doing so may result in electric shocks or fire.

Repairs and After-sales Service

Consult your Diverse dealer.

Warranty Terms and Conditions

The benefits provided to you under this warranty are in addition to any other rights or remedies you may have, as a consumer, under any other law which applies to Diverse Power Systems products. Diverse Power Systems goods come with guaranties that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for major failure and for compensation for any reasonably foreseeable loss or damage. You are entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Under this warranty Diverse Power Systems agrees to repair or replace, at our cost, the product purchased by you in Australia if the product does not perform in accordance with the manufacturer's specifications during the period of this warranty.

The Genius-II Power Supply warranty is valid for a period of one year from the original date of purchase. Please retain your proof of purchase, as this will need to be provided should you wish to claim under this warranty.

To be able to claim under this warranty you must

(a) Ensure the product is installed by a suitably qualified person and is installed in accordance with this Owner's Manual and any applicable Australian Standard.

(b) The product must be operated in accordance with the instructions detailed in this manual.

(c) The product must be maintained in accordance with the instructions detailed in this manual.

What is excluded from this warranty? Cover for any damage, malfunction or failure resulting from incorrect installation, accidental damage, misuse, abuse, tampering, unauthorised repairs, unauthorised modification by any person, corrosive environment, or infestation by insects or vermin are excluded under this warranty and Diverse Power Systems accept no liability for the same.

How to make a claim under this warranty.

(a) Contact Diverse Power Systems on 03 9213 8400, or your Diverse dealer, to obtain return authorisation.

(b) Package the product adequately to prevent any further damage, and send the product to location provided when you received your return authorisation.

(c) Please include with the product, proof of purchase, a detailed description of the fault, and your contact details.

Diverse Power Systems may seek reimbursement of any costs incurred by them if a product is found to be in good working order.

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POWER SYSTEMS

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